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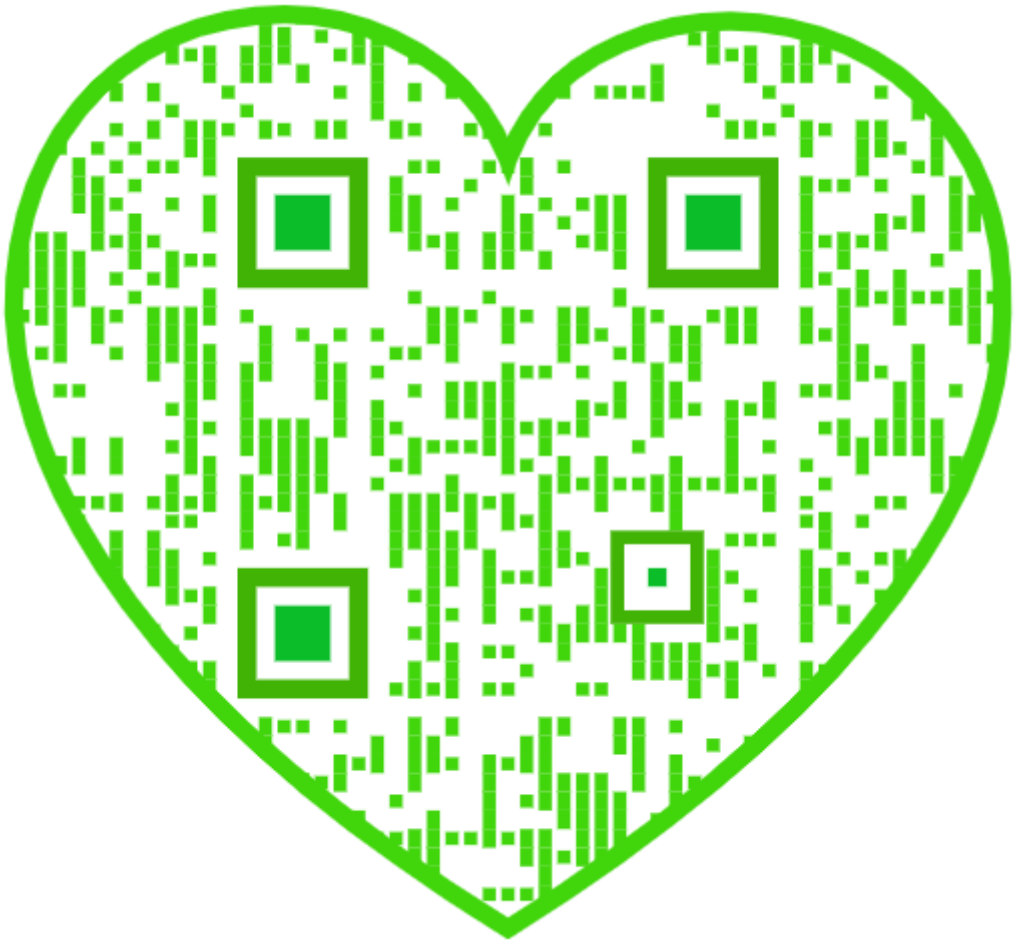

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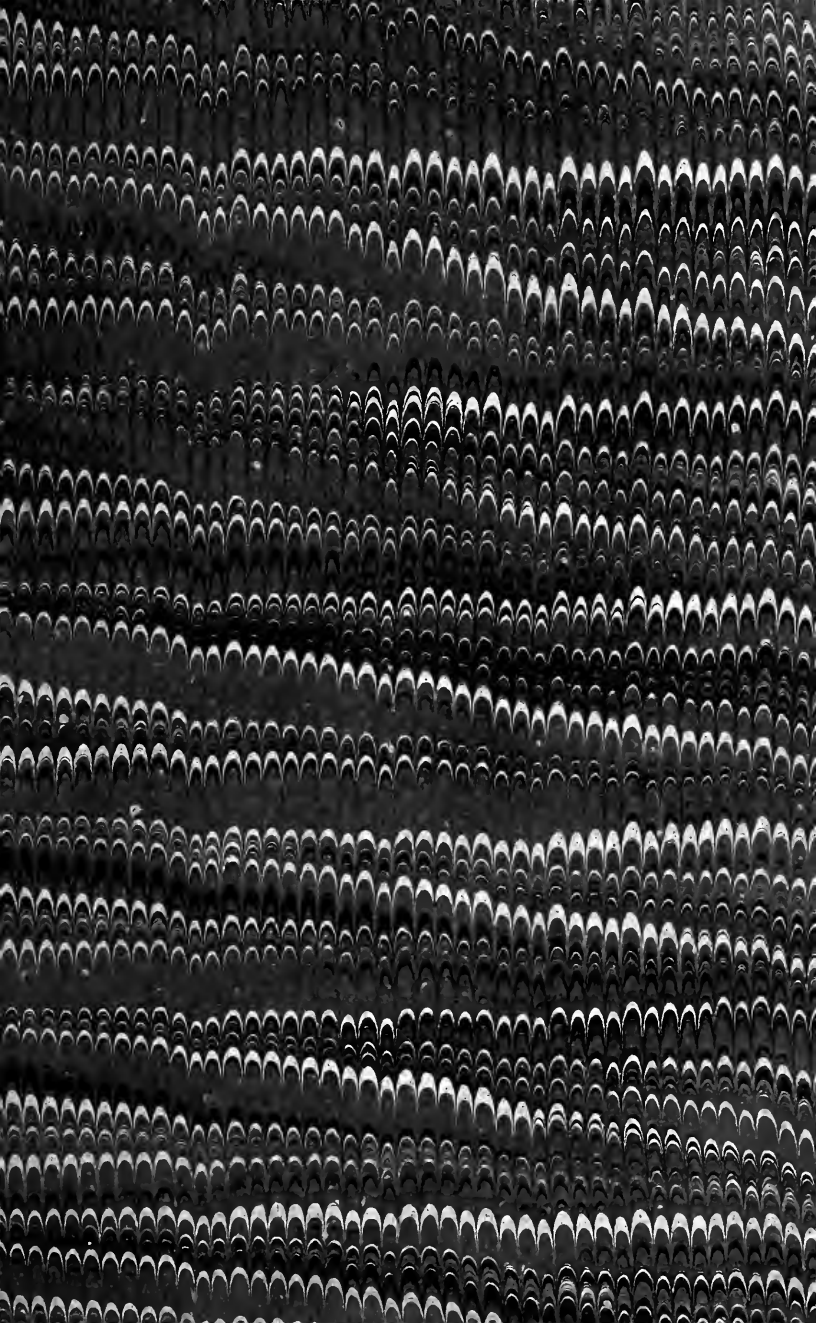

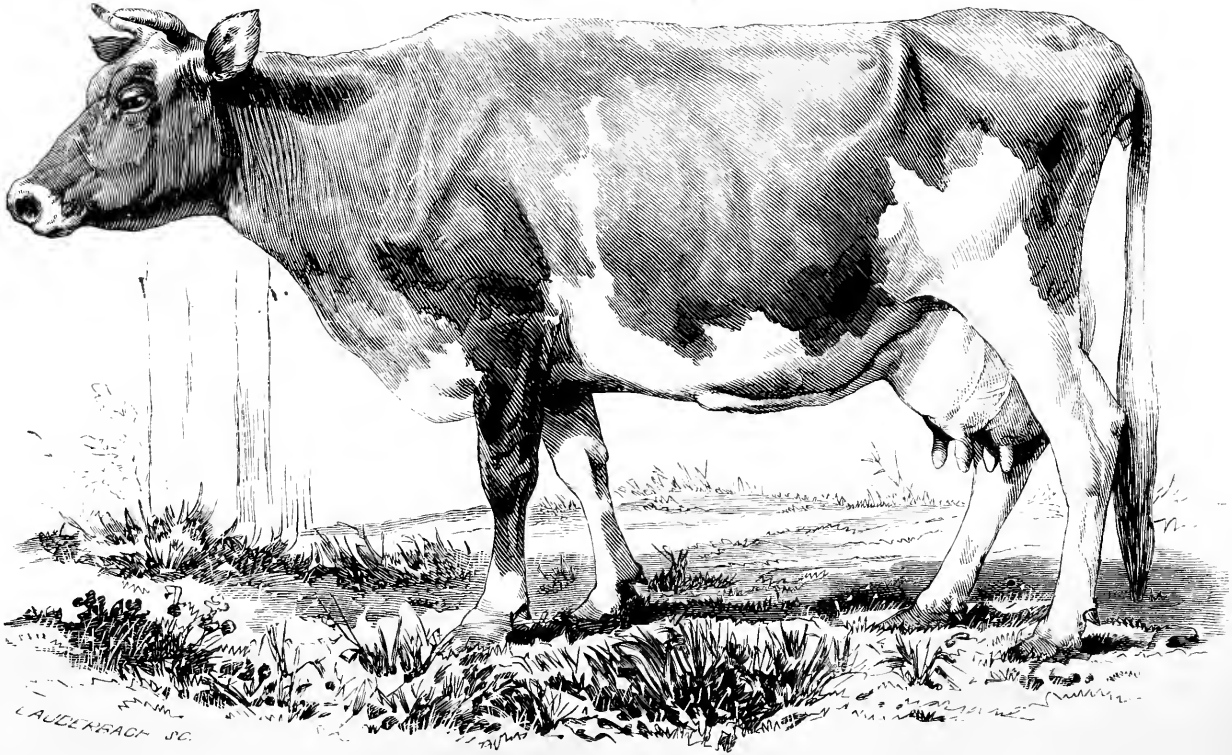

IMPORTED JERSEY COW "DUCHESS."

Owned by C. L. SHARPLESS, *Philadelphia*

BUTTER

AND

BUTTER MAKING,

WITH THE

BEST METHODS

FOR

PRODUCING AND MARKETING IT.

BY

WILLIS P. HAZARD,

PRESIDENT OF THE CHADD'S FORD FARMERS' CLUB, AUTHOR OF "THE JERSEY, ALDERNEY AND GUERNSEY COW," ETC.

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Butter and Butter-Making.

Butter is defined by Webster in his portly volume as "an oily substance procured from cream or milk by churning." If Webster is right, then we are wrong in denouncing any "oily substance" as being butter. Or perhaps, so great has been the popularity of the great lexicographer, many persons have thought they were making and selling *butter* when they produce an oily or greasy substance and put it upon the market as such, believing it must be butter because Webster says so.

Our idea is that butter—such butter as would give a man an appetite to look at, to smell of and taste of—is as far removed from an oily, fatty or tallowy substance as possible. True, it may be reduced by heat to an oily substance—so may lard, so may tallow and other substances—but it will hardly pay any farmer to go through the tedious process of making butter for that purpose. The popular desire of purchasers of butter is to obtain a firm, fine-grained article, of rich golden color, sweet, nutty, aromatic smell and unctuous taste, put up in pound or half-pound lumps, whether square or round, and which, when opened out from its moist, thin white linen wrapper, invites both the senses of smell and taste. The taste for butter is an acquired habit, and yet so delicate that it is as easily turned from "strong" or "cheesy" or "greasy" butter as it is quickly attracted to and satisfied with a

truly good article. But says some good housewife, "How can we make such an attractive article? There is a 'knack' in it. My neighbor knows how, and gets fifty cents a pound all the year round, and has a demand for more than he can supply, while ours is slow of sale at half, and often less than half, the price."

The object of this essay is to give rules in a plain, practical way just how to make such butter, such as will sell itself; how to prepare it for market, and how to pack and store it when put up in tubs or firkins. Most of it is derived from the practical experience of farmers in Chester county who supply Philadelphia, the most particular of markets, and even send it on by express to New York, and get from one dollar to one dollar and a quarter per pound. In every large city there are always plenty of customers who will pay an extra price for "gilt-edged" butter, and there need be no fear of the market being overdone. This will not cost more than five cents per pound extra to make, while it will bring a much higher price, and therefore pay a much larger profit, than the inferior article. It should therefore be the aim of every farmer to *endeavor to make his butter equal to the best*, as it *will pay* both in the pocket and in personal pride. We believe it is as easy to make good butter as that of an inferior quality. And we venture to say that it will elevate the moral tone of the whole family. We even think we can tell the character of the family by the looks of the butter, for the habits of attention and cleanliness that are formed by the making of good butter will be carried out in every particular.

It will be seen in the following essay that methods vary, and that fine butter is made in many ways, and yet it will be observed there are certain principles which rule in all, and that there is really less difference than appears; and these very differences prove the possibility of general improvement and comparative uniformity by attention to

essentials. We have therefore confined our attention to those essentials, and any one studying these as here laid down should make *good*—yes, the BEST—butter.

CLEANLINESS AND ATTENTION.

The great secrets of making good butter are CLEANLINESS and ATTENTION, in addition to the labor.

We will now proceed to give you the details how to apply these rules:

Let CLEANLINESS be applied to—the cow-house: see that it is kept clean, so that no foul odors shall be absorbed by the new milk, and that the animals may be kept healthy, so as to give pure wholesome milk; to the udder, so that no scabs or filth shall be rubbed off into the bucket while milking; to the hands, so that they shall not defile the milk; to the spring-house or vault, that the cream may be kept pure; to the milk-bucket, pans, skimmer, cream-pot and churn, so that no cheesy taint or foul odors be communicated to the cream; and finally, to the butter-worker and the market-tub. To all these scrupulous cleanliness should be applied.

ATTENTION must be paid to proper feeding, regular milking, skimming at the right time, stirring the cream every time new quantities are added, even temperature of the spring-house, vault or cellar, proper temperature of the cream at time of churning, even churning and working and handling the butter.

THE IMPORTANT RULES.

Keeping in mind always these two points of cleanliness and attention paid to the minute parts of the process, there are six cardinal points in making first-class butter, and NECESSARY to be attended to, to command the best market price; they are—

Proper feeding.

Careful milking.
Care of milk and cream in the spring-house.
Churning at proper temperature and evenly.
Working and salting the butter.
Marketing and packing for market.

In addition to which there are several minor things which are subsidiary to these, but which will receive notice in their proper places, such as proper dairy utensils and accommodations, etc.

Bear always in mind: *From the time the milk leaves the cow till the butter graces the table, milk, cream and butter must be near the temperature of 60°.*

THE CHEMISTRY OF BUTTER.

The production of butter by churning is both a chemical and a mechanical process. Milk, according to analysis, is composed of—

Casein, pure curd	4.48
Butter	3.13
Milk sugar	4.77
Saline matter	.60
Water	87.02
	100.00

Good butter should contain at least eighty-two per cent. of fat or oil. This fat, like lard and other fat, is composed of solid or margarine fat, and liquid or oleine. Winter butter contains, of solid fat, sixty-five parts in one hundred, summer butter only forty parts. This fact explains why cream should be churned at different temperatures in different seasons of the year. This fat, oily substance in the form of globules is found in suspension in milk.

By the mechanical action of the churn the envelopes of the globules of fat are broken, and the globules brought into cohesion and separate from the other components of

the cream. By the chemical process the sugar of milk is converted into lactic acid, and the bulk of the fluid, which was put sweet into the churn, is instantly soured.

Boussingault prescribes the proper temperature for churning to be 59° for sweet cream, 62° for sour and 64° for milk. About one-fourth of the total amount of butter globules which exist in the cream escape collection, which accounts for the rich taste of the buttermilk. Fresh butter consists of about eighty-three per cent. of pure butter and sixteen of milk of butter. The former can be separated by melting the whole in a long tube; after a time the butter proper rises to the top. It is then drawn off into water at 104°, and after two or three washings may be considered quite pure. In this state butter is a yellow, slightly acid substance which liquefies at a temperature of 79°. It contains seven fatty and volatile acids, together with a sweet oil formed of a mixture of oleine and butyrine, which last is a substance which distinguishes butter from other fatty bodies, although it is also found in small quantities in the stalks or fruits of certain plants, as the tamarind tree, and can be extracted from sugar, starch and other substances. Under the influence of the oxygen of the atmosphere butyrine soon turns to an acid (butyric), which is the cause of the repulsive odor of the butter that is called rancid. This acid is also found to combine with another (the oleic), forming a third, the butyrolic, which is believed to be peculiar to butter.

When exposed to the air, butter soon changes its condition. It first gets rancid on the surface from the cause before stated, and then throughout. In this condition it is dangerous as an article of food, for its acids attack copper vessels, and so poison their contents. This can be corrected by washing it first in lime-water and then in fresh water. The preparation of lime-water is not difficult, and its presence in small quantities neutralizes the acids which

develop in butter. Another plan is to shake the butter rapidly in a sufficient quantity of water containing a proportion of hypochloride of lime, and afterward wash it in fresh water or churn it in new milk, with a slight addition of chloride of soda, say three ounces to forty pounds.

To detect adulterations in butter, of which there are many, in such cases as cannot be detected by the probe, the butter must be heated to a temperature of 112°, when it melts and any foreign matters fall to the bottom. But if suet has been mixed with it, it will not melt until 158° has been reached.

The quantity of milk required to yield a pound of butter varies from eight quarts to fourteen quarts. The average is about nine to eleven quarts of milk for two of cream, or one pound of butter; or, by weight, eighteen to twenty pounds of milk should make four of cream, which should make one of butter. Two quarts of cream are a fair average for one pound of butter; this according to the breed, the feed and management, the age, and the time of the next gestation. As a general rule, cows of small breeds yield more butter than those of large breeds, and the smaller individuals of a particular breed give richer milk than large specimens of the same breed. The larger animals and breeds, on the contrary, produce more cheese. A comparatively dry and warm climate is favorable to the production of butter, and a cool, moist region to cheese. The evenings' milk of cows at pasture is preferable for cheese, the mornings' milk for butter, particularly if the animal is stabled or kept in the yard. Cows eight to ten years old will give milk producing forty to sixty per cent. more cream than the milk of their offspring two years old, though fed alike.

Milk may be poisoned in the udder by the cow taking improper food and water, and the cow not be affected. If.

therefore, milk is so liable to taint, it follows that the quality of butter very materially depends upon the water she drinks.

Milk-coolers should never be made of zinc, as lactate of zinc may be formed and give rise to nausea and vomiting.

FEEDING FOR MILK AND BUTTER.

Suppose the farmer is about to start in the butter-making; he would naturally be very careful to select those cows which promised to give not only quantity, but quality. It is foreign to our purpose to discuss the different breeds or the best mode of judging of the quality of the cows, but for butter cows we can safely recommend the Jersey, or, popularly styled, Alderney, and the Guernsey. Their cream is very plenty, very rich in butyraceous qualities and of fine color. If not to be had at satisfactory prices, at least one of these breeds to every six cows of other breeds should be kept to color the butter; and if the farmer will get a good Jersey bull, he will soon improve the quality of his herd. To judge a cow for butter, her hide should be thin, soft and mellow, and under the hair of a deep yellow color; her udder should be soft and yellow skinned, well covered with zigzag veins, large and broad; her tail at the end rich yellow; the inside of her ears and around the eyelids yellow. With such marks, and the marks for quantity also, the purchaser will not make a mistake in selecting her. The system of Guenon on escutcheons, or milk-mirrors on the udder and thighs, is invaluable for testing the quantity and quality of milk, and the length of time she will milk up to or near her calving. The cows which give poor milk should be sold to the butchers, and their places supplied with good ones.

With a good lot of cows, and a bull that has a good escutcheon, the farmer must pay attention to the feeding and watering. Out of nothing can come nothing; there-

fore to have good butter we must have good milk. The cow is in an artificial state on a farm, highly stimulated to produce milk as nearly all the time as possible. Therefore the machine must be supplied with the pabulum to turn out milk rich enough to make butter. This it is not in the province of this essay to say much of; but in summer-time the cows should have plenty of good rich pasture, so as to fill themselves soon and easily and with sweet and nutritious grass that has strength, so that they may not have to work too hard for their living, and can lie down and chew the cud and make milk. The pastures should be kept clean of weeds, for they will give a bitter taste to the milk, and undefiled by pigs and poultry. There should be groups of trees, necessary for their comfort, and comfort promotes secretion of milk. Water, access to which should be easy and to be had at all times, should always be pure, whether running or in troughs. No access should be allowed to muddy, standing or stagnant water; this is very important, or the milk will not be pure nor the animal healthy. Shade should be provided in each field, where the animals could become cooled and be less annoyed with the flies.

Toward the close of summer and in the fall when the pasture is becoming short, the flow of milk and its richness can be kept up by cutting for them green corn fodder, sorghum, Hungarian grass, or giving them an early crop of sugar-beets. It is very important corn should be sown broadcast or drilled in, so as to materially help out the pasture at this time. Bran with a little cornmeal may be fed at evening; it will promote the flow of milk and help keep them in good condition to commence the winter with.

In winter they should be fed upon the best of hay; clover and timothy mixed makes the best, and if cut early and cured to be as near the summer grass as possible, it is

the best for a reliance. In addition, they should have about ten quarts bran and cornmeal mixed; mangolds, carrots, parsnips, small potatoes and such roots, for variety and to keep their systems open. Corn-fodder or blades, shorts, middlings, oil-cake, pumpkins, etc., are all good. Corn-fodder alone or as a reliance will not make good butter. The effect of clover upon the supply of milk is well known; the dry material of it is equal to beans for albumen. Albuminous matter is the most essential element of food for the milch-cow, and any deficiency in the supply will be attended with loss of condition and diminution in the quality of her milk. A cow can yield a far greater weight of butter than she can store up in fat. A cow may give two pounds of butter a day, while half that quantity would not be laid on in fat if she was fed for that purpose. Winter is the time it is most difficult to produce good-colored butter and free from streaks, and the harder to come; judicious feeding will help this very much. Where the stock kept is numerous enough, it will pay well to steam or cook the food and feed the hay-tea to the cows; with a little salt through it, they will eat up everything greedily. A lump of rock-salt should always be where they can have access to it.

FEEDING TURNIPS AND CABBAGE.

The ease with which turnips and cabbage can be grown, and the quantity produced on an acre, induces many farmers to feed them to their milch-cows. This should never be done where good butter is desired. They make most admirable feed for sheep, improving and making the mutton more juicy; also they are good for steers and dry cows. But it does seem impossible to prevent their flavoring the milk. If they must be fed, the best way is not to give the turnips or cabbage to the cows just before milking, but only immediately after the milking is done, particu-

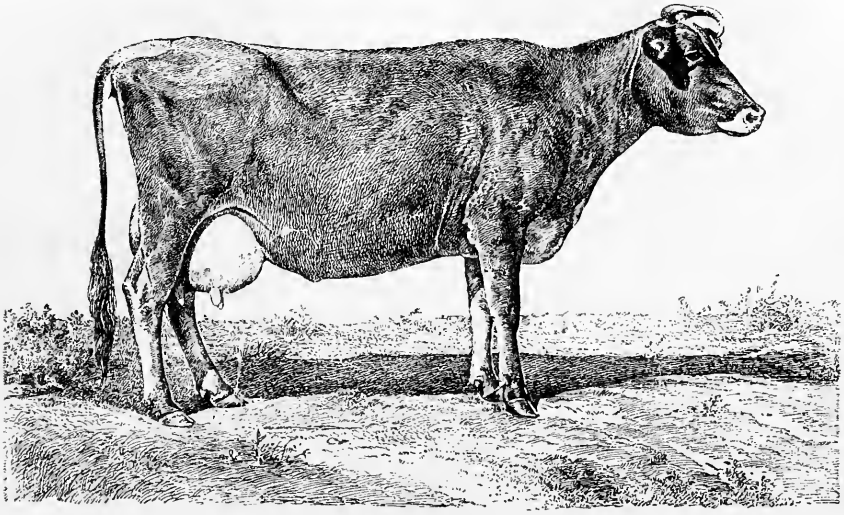
larly at night. A little cornmeal with salt sprinkled over them after they are chopped up is also an improvement.

If you *have* fed the turnips and *have* got the taste in the milk, then, when you put the milk into the pans, to every eight quarts mix one of boiling water. This will annihilate the taste of the turnips, and facilitate the rising and the churning of the cream. But do not attempt to put such butter up for keeping; use it or sell it within a short time.

Another receipt is: Put a piece of saltpetre the size of a pea into the pail before milking; the heat of the milk will dissolve it and destroy the taste of the turnips. Another is: Put a teacupful of sour cream into the clean cream-jar, then empty the milk into it on the sour cream. Another is: Put your milk in a kettle, then place the kettle inside of a larger one on the stove that has boiling water in it; stir gently the milk or cream until lukewarm, then to every two gallons throw in one ounce saltpetre, powdered fine, and continue stirring until so hot you cannot bear your finger in the milk or cream. Then remove the milk-kettle and pour the milk into the churn. Repeat the process with the rest of the milk or cream. Cover the churn, and put it in a cold place for the night, or at least till the cream or milk is quite cold again; then churn in the usual manner. Do not add any hot water while churning. Another is: Add to every two gallons of milk, as it is drawn, a dessertspoonful of a solution of nitre; or, add to every gallon a tablespoonful of the clear solution of half an ounce of chloride of lime in a gallon of water.

COLORING BUTTER.

It has become a common practice to color butter with the extract of annatto to help its sale. This is all wrong. The color should be derived from the food, and only from early cured hay of the best quality and cornmeal can



TIBERIA.

One of the Centennial Premium Herd, owned by C. L. SHARPLESS.

this be done. The cow must be well wintered to produce good butter.

As it is the general practice to color butter, we may as well give the best processes by which it is done. A small quantity of annatto dissolved in warm water or milk is put into the cream before churning. But a richer tint is produced by coloring the butter directly. To prepare the annatto for this, steep it in butter for some hours over a slow fire, then strain through a fine cloth into a jar and keep in a cool place. When ready to work the butter, melt a small quantity of this mixture and work it in carefully. An inexperienced hand is apt to work the butter too much in endeavoring to produce the same shade of color throughout. Coloring in the cream obviates this difficulty. Carrots of the deep yellow or orange variety give the most natural color and agreeable flavor. They should be grated, the juice expressed through a thin cloth and put into the cream before churning.

The best and sweetest butter is produced in May and June (never so good in August and November), for then there is a supply of rich, juicy food, and the air is pure, and all things combine to render the dairyman's task easy and delightful. But when the sun has scorched the vegetation and impaired its nutritive properties, and the temperature of the atmosphere is like an oven, then there is need of skill in providing succulent food, and counteracting the opposing influences of Nature. And still later the supply of roots, pumpkins, etc., will keep up the good color and richness of the butter in December. In winter the stables must be kept warm, but not with confined air. The stables can be kept sweet by the daily use of plaster, charcoal, prepared muck, or an occasional sprinkling of dilute sulphuric acid or solution of copperas. The cows should be put out nearly every day for air and exercise. They must at all times have suitable shelter.

METHOD OF MILKING.

Milking should be done regularly, quietly and thoroughly, yet quickly. Twice a day is often enough, and should be done as near six o'clock in the morning and six in the evening as possible. There are some instances where cows require to be milked in the middle of the day to relieve their udder, but as a general rule it is a practice to be avoided, as its tendency is not to further retention of the milk in the udder. Milking should be done quietly, without any scolding or kicking or hurting the animal, and she will then habitually come gladly for the operation, stand quietly and let down her full flow. It should be done thoroughly, and as near as possible always by the same person. There is a great difference in milkers; some will get the last drop, while others will leave the richest part in the udder. It has been well proved that the strippings will yield from ten to twenty per cent. more cream than the rest of the milk; how important it is, then, the cow should be milked clean! Besides, if she is not made to yield all that she has daily, she will dry up sooner, and gradually fail in the quantity until it decreases perceptibly. Cows should never be hurriedly driven to the milking-shed, as it agitates and heats the milk, and sometimes makes it bloody, and makes the cow nervous and overheated, at which time she will not let down the flow so readily. Milking-sheds are now used on most well-ordered farms, as they are cooler, cleaner and the animals are less worried by the flies.

The best plan for milking-houses is to have nearly the whole sides in open doors and windows, which can be opened in summer and make the place airy and cool, and closed in winter, and then used as a stable for young stock About twenty-two by thirty-six is a good size, with a row of stanchions on each side, and mangers fitted to hold

bran or cut feed. The floor is best made of clay well rammed. The entry-way between the two rows of stalls ought to be wide enough to drive a cart through. The house, with very little extra cost, may be made two stories high, for the storing of hay.

It is astonishing to see how regularly each one goes to her stall, as they soon learn from habit. They should either be chained to an iron ring sliding up and down on an iron bar attached to the stall, or put in stanchions. The latter are the easiest and best, though we do not approve of them for the long winter use, as too confining. A lump of rock-salt in each trough is a good thing to keep them quiet while milking. It is doubtful policy to give them any feed while milking. Some advocate it, as it brings them more willingly to the stall and keeps them quiet. Others again, and justly, assert that it distracts their attention and they will not let down their milk so freely and regularly. It certainly does seem, if their attention is taken off from the milking to their eating, they will pay more attention to the latter, and be apt to be more nervous at the interruption. The salt will answer the purpose, and occupy them just enough to keep them quiet. Kicking cows, though they often prove to be the best, are certainly not the pleasantest; they are vicious from some hidden cause of suffering or pain caused by the operation of milking. Various remedies and inventions have been suggested, but perhaps a strap buckled around the legs is about as efficacious as any.

The cow must be looked after as soon as she comes in; and if the calf does not take all the milk from her, she must be milked sufficiently after to prevent her bag from becoming feverish and caking, as one milking from a feverish cow would spoil a whole churning, and that would spoil an entire firkin in which it was packed, though it might not be perceptible for immediate use, and none but

the skilful butter-maker would perceive it in the churning. Such milk froths and foams; and when it does this, as well as from other causes, it is always safest to sell the butter from it for immediate use, or pack it separately in a firkin to sell for what it will bring.

CARE OF THE MILK.

The milk should be taken to the spring-house and poured through the strainer into milk-pans, which should then be set in the water of the spring flowing through the house, as it will promptly take the animal heat out of the milk, which is quite important. The advantages of a spring-house are decided over a vault or cellar, as the temperature is more likely to be even and uniform; besides, the air of the house is not so confined as that of either the vault or the cellar, and is free from any impure contamination from decaying vegetables, meat, or other substances usually stored there.

The question of the material for the pans is not decided, some recommending glass, earthenware or tin; wooden pails should never be used. The first are preferable, but too expensive, from liability to breakage, and require more care in handling; the second have the same objection, and not being made with care have roughnesses which will hold the milk, which, though in small particles, may become rancid. For ourselves—and it is customary with the best Chester county butter-makers—we use the best tin pans, painted on the outside, with bales to them; not handles on the sides, as they require two hands to lift them, lower stooping of the person, agitate the cream more if they have to be moved, and the projecting handles are more in the way. The tin pans are light to handle, quite as readily cleaned and kept clean as the others. They should be kept perfectly sweet and clean. They should be scalded with boiling water to prevent the development of crypto-

gamic germs, rinsed in pure spring-water, turned down to drain, and then exposed with the inside to the sun to sweeten. For this purpose a bench should be kept outside of the house large enough to hold a number, for which also they can be piled in rows one above the other. In summer it is necessary to see that all utensils are cooled perfectly before using them.

SETTING THE MILK FOR CREAM.

It is a mooted question as to the depth the pans shall be filled for setting the cream, and the arguments are strong for both deep and shallow pans, those who *argue* the matter generally remaining firm that their own way is the best. Those in favor of deep pans, which should hold about twelve quarts, or rather deep setting of the milk, argue that the cream *will* rise to the top under all circumstances, and therefore there is less exposed to the air to become contaminated or cheesy and form into a skin, as it will do if exposed too long. Now, this objection is obviated if the milk is skimmed regularly every day, as it should be. We favor the shallow setting of the milk, say from three to four inches, as we believe there will be more surface to receive the cream, and the whole of it will rise, and less will be retained in the milk from any effort to rise. If the air of the milk-house is kept pure, and so that the winds will not blow over the surface of the pans, the cream will come out all right; if disturbed while the cream is rising, it becomes agitated too much for the perfect separation of the two.

In many of the butter factories the water is in tanks or vats about eighteen inches deep, sunk in the earth, in which are set tin pails twenty inches deep and eight to ten inches in diameter, the milk standing seventeen inches deep in the pail. The cream nearly all rises in twenty-four hours, is never allowed to stand over thirty-six hours, and

is skimmed before the milk sours. In large dairies the setting of the milk in deep vessels saves the washing of many shallow ones; and if the temperature is kept about 60° uniformly, the deep ones will probably be the most economical.

The milk should not be set more than thirty-six hours, and it is better if skimmed in twenty-four hours, as what little might be lost in quantity would be gained in quality. But the time depends upon the temperature; just long enough for all the cream to rise, and no longer, is the rule. It should be skimmed before it becomes acid at all or thickened. Many who make first-rate butter let it stand thirty-six hours before skimming; but if it once begins to turn partly to water, the cream will have a bitter taste that can never be overcome. The first cream that rises is the best, both in flavor and color. It should be slightly acid before it will make butter; and in cool weather it must be put in a warm place for that purpose. It is unnecessary to scald the milk or cream; also, it gives the butter an unpleasant flavor, and it is useless labor. An ounce of fine salt to a three-gallon jar of cream, when you begin to fill, is an improvement, and an addition of salt to the cream makes it churn quicker. Cream should not be longer than three days, or a week at furthest, in collecting before it is churned, to make the sweetest butter. As a general rule, the quicker cream is converted into butter, the sweeter and better is the butter. At the proper time to be removed it will have a bright, healthy appearance, a rich yellow, uniform color and an adherence of particles. Sour cream contains more casein than sweet, and will not retain its fine flavor so long, nor will the butter made of it have so fine aroma; slightly acid can hardly be detected. It is one of the mooted points, we confess, whether sweet cream yields as good and long-keeping butter as cream from sour milk. The rule with very many in

Chester county is to skim from sour milk, as, they say, *all* the cream is not obtained from sweet milk. But it is considered an important point to skim as soon as possible after the acidulous fermentation has commenced, so as to avoid all danger of absorption.

SKIMMING AND CARE OF THE CREAM.

Many are so particular about putting into the cream-pot only cream they will use only a skimmer with holes in it. This is unnecessary, as a simple shallow tin saucer will not take up milk enough to make the butter any longer in coming, and will be more likely to get all the cream. It does no harm to skim the milk close, sufficient care being taken that the cream does not stand too long, as sour milk in the cream will cause rancidity in the butter. The cream-can should be not less than eighteen inches deep and ten to twelve inches broad, for a small dairy; for a large dairy, cans holding about twelve to fifteen gallons are a good size. Upon adding cream twice a day, it should be stirred with a wooden spatula, and the surface all around the can above the cream be carefully wiped, to clean off any drops that may be splashed on the sides, as if left exposed in such small particles, it would become tainted and give an unpleasant odor to the rest of the cream. The can should be kept covered only with a coarse-meshed muslin or a piece of gauze, to keep the flies out and let the air in. The can may be made of tin, glass or well-glazed or enameled stoneware, not in the ordinary earthenware crocks, as the acid affects the common coarse glazing and imparts a mineral poison to the cream.

WINTER CARE OF MILK.

The winter care of milk requires rather different care from that of summer, the effort being how to keep it warm

enough rather than to keep it cool. On the approach of severe cold weather a dairy apartment should be provided, warmed in some way by artificial heat. Circulating hot-water pipes are the best for maintaining a uniform temperature. The temperature of the room may be lower than will suffice to coagulate the milk, but it must not be kept at so low a temperature, nor remain so long as to become bitter. When the firm, leathery appearance of the cream, together with its thickness, indicates that it has all risen, an incision may be made in it with the skimmer, and by dextrously holding the cream back, the milk may be poured from the cream expeditiously and without waste. The cream should at no time stand longer than three days without skimming. The cream may now be stored in a cold apartment.

To hurry the rising of the cream, particularly in rooms where the heat is not of the uniform temperature of 60°, the milk may be scalded as soon as strained, which will give the cream a fair start. If scalding is not sufficient, two or three spoonfuls of sour milk which has soured quickly and is not bitter may be added to each pan of milk when it is set away; this will sour the pan and make it rise quicker.

In winter the cream may be prepared for churning thus: The day before churning the cream is all mixed together as evenly as possible, so that no fresh cream will be in a can by itself, and warmed over a stove, stirred constantly, to a temperature of from sixty-five to seventy degrees, and then placed in a room where it will be warm enough to have the whole get slightly sour. The next day it is warmed up again in the same way to the desired temperature for churning. If the cream when at the right temperature is too thick and stiff, it will come *too* soon, and all the cream will not be churned and some be wasted into the buttermilk. Such cream should be thinned with

milk to diminish the friction and retard the process, so that all may have time to be churned alike.

We have heard of excellent butter produced where the practice was to rinse the milk-pans out with alum-water immediately before putting in the milk. This causes the cream to gather more rapidly, and does not in the least affect the flavor of either the milk or the butter. The experiment might be tried.

SPRING-HOUSES AND ICE-HOUSES.

No farmer can hope to make first-class butter profitably without plenty of pure soft water upon his place—at least without so much care and trouble that it will not pay. Pure soft water is necessary for the cows, and it is necessary in making the butter in all its stages. Those who have a spring of cool, soft water on the farm have one of the first elements of success; the running water through the spring-houses helps to carry off all noxious odors and preserve an even temperature. To such we say, Build a spring-house, as the animal heat can be promptly abstracted from the milk after milking. Those who have not should do the next best thing, and that is build an ice-house from twelve to eighteen feet square and deep, the larger and deeper the better, along the shady side of a hill, so that the ice may readily be hauled to the top of the hill and be dumped in. Attached to the ice-house, and the one side of the ice-house forming one side of the dairy-house, build a dairy-house with its floor below the bottom of the ice-house. In the floor of the ice-house, through the centre, construct a ditch or reservoir, with the floor of the ice-house gently sloping from the two sides to it, so that it will receive the drainage or meltings from the ice. This drain should be slightly sloping into the dairy-room, so that the water should proceed that way for an outlet. In the dairy-room the reservoir should widen out and be of

shallow depth, say four or five inches—of depth enough to come higher up the pans than the milk is inside, and of sufficient width and length to accommodate two or four rows of milk-pans, as many as may be needed for the size of the dairy. The reservoir should be built of brick or slabs of slate or stone, and laid in cement. The lowest end of that in the dairy-room should have an outlet hole, with a perforated cover or valve-trap, so that the surplus water should gradually escape, and at the same time prevent odors and mice or other creatures from coming in through the outlet pipe. That part of the reservoir in the ice-house should be covered with a grating of iron or wood, to protect it from contact with the ice and yet allow the meltings from it to drain into it. Thus there will be always a supply of cool water, and of about an equal temperature, to keep the milk at a uniform degree. To construct it to act properly, the whole should be on a liberal scale, which would also allow a separate portion to be partitioned off, so that a stove might be placed therein to heat water for washing the pans, and have room to do the churning and work the butter.

The spring-house should be built over or very near the head of the spring, so that the water will not have to run any distance exposed to the sun and be warmed. It should be about thirteen by twenty feet for a dairy of twenty cows, and one foot extra length for every additional cow, built of stone, nearly two feet thick, about twelve feet high, with a shingle roof; or, better, a double roof with ventilation through the open cornices; or, still better, with an entire shed built a foot higher than the roof over the whole house, and extending as a porch on each side some six to eight feet; or of brick with hollow walls to keep it cool; with not more than three windows, one on each side and one at the end opposite the door; the windows protected with a very fine screen of wire gauze on the outside

to keep out the flies and gnats, dust, etc., and on the inside with double glazed sash to raise and lower, so as at times to control the temperature; or a single sash opening back and fastening against the wall, or made to slide along the wall to and fro; or the windows may be long and low, near the top of the house, simply covered with wire gauze, which would give constant ventilation at the upper part of the room, without letting the wind blow over the milk, for the wind dries the cream, and dried cream will not make butter. The spring, entering under the end wall, spreads itself around the three sides of the room, escaping at either end through a small grating set in the wall; from the spring-house it may be conducted into a tank or vat under a shed and used for washing purposes. The water flows around the three sides of the centre (the door forming the fourth side), which is raised some four to six inches above the water-way. The water-ways should be wide enough to take in two rows of milk-pans easily, and deep enough to allow the water always to be a little higher than the milk in the pans. They, as well as the centre raised portion, are better made of large slabs of slate, set in cement, or brick, or large dressed flat stones, either one set in cement; or if made of rough stone, they should be faced with cement to make them smooth and water-tight; or if a good mason is employed, the water-troughs and centre platform may be made of the best quality of lime or cement and sand, which, if allowed to stand long enough before being used, will become as hard as a solid rock floor. In either case the floor should be smooth and free from cracks, so that it can be kept perfectly clean and sweet. The walls and overhead should be plastered and whitewashed at least twice a year, and kept free from dust and cobwebs.

In such a spring-house the milk can be kept still, for if stirred much it will become sour, at a uniform tempera-

ture of about 58 to 60°, so conducive to the best formation of cream. In very hot weather blocks of ice may be laid in the water between the pans, and in winter a vessel of water may be kept on the stove to evaporate and keep the air of the dairy-room moist. In an adjoining room or house can be carried on the churning and butter-making, or in a neighboring shed can be put up the horse-power and churn for large churnings.

DAIRY-ROOMS.

Everything must be removed that will impart impure odors or taint the atmosphere of the dairy-room, and thus injure the butter. The shoes of the dairyman should be removed when coming from the barnyard, and exchanged outside the spring-house door for another pair kept there for the purpose. Otherwise it would be impossible to prevent carrying in sufficient filth to taint the atmosphere and communicate it to the milk. Another source of injury to the taste of butter is the imperceptible odor from kerosene lamps, which have often to be used in the dairy-house. This can be obviated by having the lamps set in sockets, and a pipe leading outside placed over the top of the chimney, which will carry off the odors. Or a box containing the lamp and reflectors can be so constructed, either built in the wall with glass front on the inside of the house and opened only from the outside, or arranged in the window. It should project on the outside in either case, so as to be readily reached from the outside, and should have a pipe for the exit of the smoke. It is most important to have pure air, and that the milk-room be clean, cool, dry, airy and well ventilated. The temperature should range about 60° to 65°, never higher than the latter and not lower than 55°, as cream separates best in a cool place. Milk set and kept at a temperature of 40° will not sour, and the cream will become bitter before it

is fit to skim. If the milk is set to rise in a hot room at a temperature of 70° to 72°, it will very soon become sour and thick, will not yield so much cream, and will make soft, oily butter, which will soon become rancid. The dairy should front the north and be shaded by trees, so as to admit the light and air, as light is necessary to develop color in cream, but exclude the sunshine and the heat. Evergreens are the best for this purpose, as they cool the atmosphere in summer and warm it in winter. A good ice-house is a necessary appendage to a dairy, as a free use of ice is useful in preserving an equilibrium of temperature, and often in marketing the butter in hot weather.

In many of the Western States, where the ground is not so rolling and hilly as some more favored regions with springs, a good spring-house can be made near a well, which will be very convenient and nearer the house than the spring might happen to be. The ground may be excavated about four feet, by some twelve feet square, and a solid stone wall two feet thick laid in cement, and four feet high. The floor inside is laid in cement at the bottom of the excavation, slightly inclining to one corner, for complete drainage and washing. The wall is built up full width, four feet, and then an offset of eighteen inches is made to the rear, or outside, where the wall is carried up two feet higher, but only six inches thick, to form the foundation of the frame superstructure; on this is built a balloon frame with eight-feet posts, boarded outside and in, and the wall made as tight as possible. Upon the ledge created by the offset, a narrow wall, about four inches high and wide, is made on the front edge of this ledge, by which, being well plastered with the cement, a gutter or vat is made some four inches deep, and of course thirty-two inches wide, with a slight descent to the corner opposite to that where the water is

introduced. Into this vat the fresh milk is set while warm, and cold water conducted to it from the well. The milk cools rapidly and a low temperature is maintained through the night. At each milking the pans are removed to the shelves or on the cement floor in the centre, to make room for the fresh milk. The water can be pumped into a trough which will carry the water to the dairy-house any distance it may be placed from the house; but the nearer the better, so that the water shall not cool in its passage. If it is introduced in the centre of one side, the gutter should slope both ways to the corners, and following the sides, be allowed to escape at either far corner through a pipe built in the cement. These escapes should be furnished with plugs to hold the water, so as to allow it to be changed once or twice daily.

The following is the exact plan of a model dairy-house of one of the best Chester county butter-makers, and is one of the most complete, considering its cost. The main building, which is built on a hillside, is fifty feet long by thirteen wide. The room for the milk is six feet below the surface and twelve feet from floor to ceiling. This allows ample room for ventilation and light by side-windows. The troughs for holding the water in which the milk is set are formed of brick and cement, with their bottoms one foot above the level of the floor of the building. They are twenty-eight inches wide, so as to take in two rows of ordinary milk-pans. Across one end is a trough formed similar to the others, except that it is so arranged as to receive and hold the water to a greater depth than the side-troughs, so as to contain the cream-cans. In all there is an ingenious arrangement for increasing or decreasing the depth of the water so as to suit the temperature outside. The water is drawn from a well by a "telegraph" pump, and the surplus is passed off by a

drain, secured against the upward passage of odors by a "bell-trap." During the winter no water is used, and a fire is lighted to keep the temperature to the proper point. The utmost care is taken in ventilation, even to a small ventilator under which to set the lamp used when too dark for skimming without artificial light. At the front and in each side of the main building is a wing thirteen feet square; one of these contains the power-machine, the other the needful arrangement for heating the water and washing pans. For working the butter a large inclined table and lever are used, and the printing is done by an ingenious machine for stamping and marking in squares. This milk-house is made for a dairy of fifty cows; and it would seem, therefore, the proper proportions are thirteen feet wide by one in length for each cow. This house it would be hard to improve on.

If a cellar, or, better, a vault, is used, it should be plastered, whitewashed, have a stone or cement floor, be furnished with wire-gauze-covered windows, and be appropriated exclusively to milk, cream and butter. A dairy-house built upon the ground, scientifically constructed and properly shaded, might doubtless be preferable to a cellar; yet, all else being conducted right, very good butter may be made in a cellar properly located and ventilated. The flues built in the walls of the house should go down into the cellar, and by leaving the stove-pipe holes open a free circulation is created. In the vault the pans are set directly upon the floor.

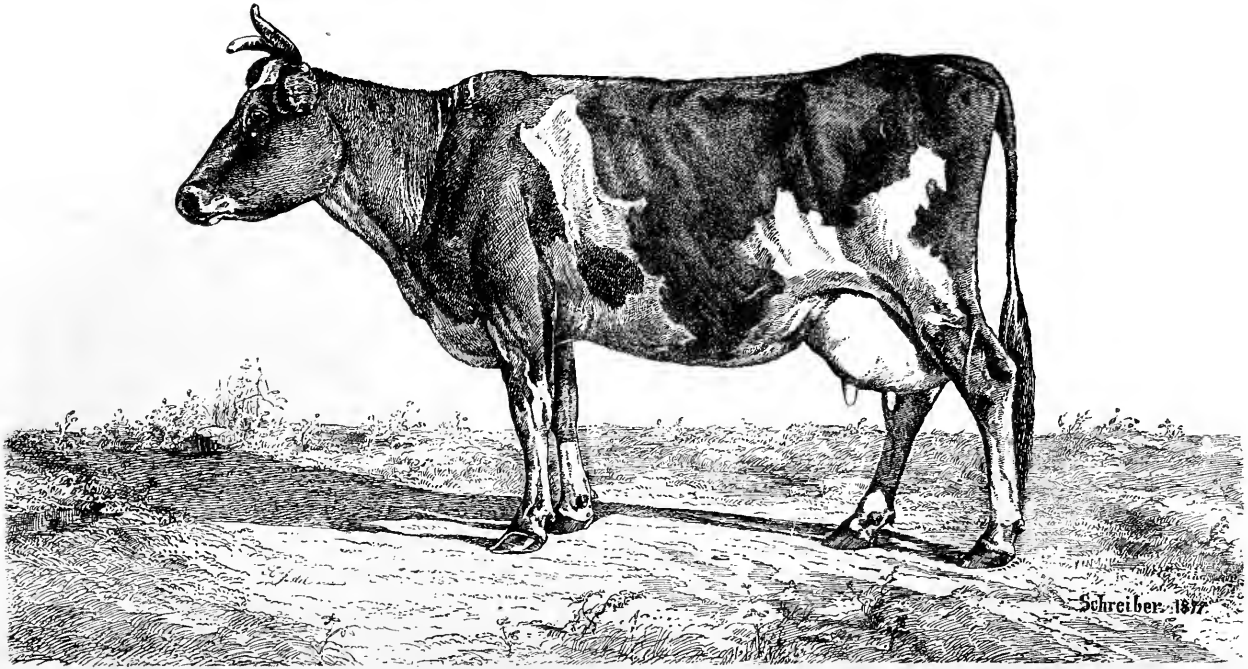
In either the vault, the cellar or the spring-house, as the important consideration is to maintain a low, uniform temperature, it is absolutely necessary to have a reliable thermometer; and this should be hung as near the centre of the apartment as possible and a foot or eighteen inches from the floor, as the temperature is often quite different there from that above. A lactometer is also a most useful

instrument to test the quality of the different cows of the dairy.

To keep midges, flies, etc., out of the milk, make hoops of rattan, strips of hickory or ash, or springs out of dress-hoops, cover them with mosquito-netting, wire-gauze or very open mesh-muslin—something that will not stop the circulation of the air—and when the milk is cool lay these over the pans.

CHURNING.

Churning in summer is best to be done in the morning early, while it is cool; in winter, it must be done in a warm place. Rapid churning is not the best, but an even, steady, moderately slow time is; fifty to sixty strokes of the dash per minute will generally bring the butter in thirty minutes. If the cream is slightly acid and of the right temperature, say 55° to 60°, it will require less than half an hour. We believe that butter produced in about that time—or in forty minutes—is better for keeping than that produced in longer or shorter time. If it is not the right temperature, set it in a moderately warm place until it is, or place the can in a large boiler of warm water till it is right. The churn should not be soaked over night. In the morning put in a quart of boiling water, churn it one minute, then draw it off and pour in a pailful of cold water, to remain in the churn five minutes. The cream is then agitated until a complete separation of the fatty matter from the milky fluid has been effected. All the buttery particles of the cream or milk are encased with thin pellicles of casein or cheesy particles of milk. If the churning is done so quickly as to fail to break up or separate the casein pellicles from the oily or buttery particles, the butter will have that cheesy flavor which all dislike so much. If the butter will not gather, pour into the churn some ice-cold milk. Much butter is spoiled by churning the cream too warm.



IMPORTED NIOBE.

First Premium, Centennial Exhibition. Owned by C. L SHARPLESS.

The churn should be as nearly straight up and down as possible, and the dash should stir all the milk every stroke it makes, so that the butter should all come at the same time. Care should be taken that the dash shall strike the top of the cream and the bottom of the churn at every stroke. If the churn be filled, so that the dash cannot strike the top of the cream, the operation can scarcely be accomplished. Rapid churning should be avoided at the commencement, though the motion may be accelerated after the cream curdles with butter. There are many favorite churns of the barrel pattern, of which the most used are Spain's Atmospheric churn, Blanchard's churn, Davis's World's Fair. We believe, however, the best is the simplest—the old-fashioned upright churn, which can be so arranged as to work the dasher with dog or horse-power.

The size of the churn and other dairy utensils should of course be proportioned to the requirements of the dairy. In large dairies in Chester county are used barrel-churns worked by horse-power. The churn is a large barrel, bulging only enough to make the hoops drive well, with a journal or bearing in the centre of each head, and resting on two uprights, so that it may be revolved by horse-power, or in favorable situations by water-power from an overshot wheel. This barrel has stationary short arms attached to the inside of the staves, so arranged as to cause the greatest disturbance of the milk as it passes through them in the turning of the churn. At one side is a large opening secured by a cover that is firmly fastened in its place; this is the cover or lid of the churn. Near it is a hole less than an inch in diameter for testing the state of the churning and for drawing off buttermilk; this is closed with a wooden plug. This hole also allows the escape of the very last drop of the buttermilk or water when the butter has collected.

Churn as often as once a week, and as much oftener as circumstances will permit.

Upon churning, add the cream upon all the milk in the dairy.

In Scotland a syphon is sometimes used to separate the milk from the cream, instead of skimming the pans.

Butter-makers in this country seem to be thoroughly divided in opinion upon the question of churning the whole milk or only the cream. By far the greatest majority in this country churn the cream, while in England, Scotland and a good part of Ireland the milk is churned quite in as many cases as is the cream. Carefully conducted experiments have proved that there is a gain in quantity where the milk is churned of full seven per cent. over the yield of cream alone. In small dairies the quality must be much improved, for by churning the milk the risk of tainted cream is avoided. Some of our best premium dairies churn the milk. The most common objection to churning the milk is the labor, but power is now so cheap (horse, dog or sheep) that the objection has little force as compared with the increased quantity and improved quality. Besides, when the labor, time and trouble of skimming and taking care of the cream are taken into account, we doubt whether there is any increase of labor.

Another objection to churning the whole milk is the amount of caseine contained in it. Caseine is highly nitrogenous, and soon decays, emitting a disagreeable odor and imparting it readily to other substances.

Where the entire milk and cream are churned, when the milk is strained it is allowed to remain without being skimmed until the cream is sufficiently ripe for churning. This point is ascertained when a thick, uneven scum or veil appears on its surface. As in the other case, each meal's milk is always strained into separate vessels; and although all the cream, when put into the churn, is not of

the same degree of ripeness, still this does not affect the whole; and the temperature, as also the variation of motion during the process of churning, is precisely the same; besides, the quality and produce of butter will be not only equal, but more than from cream only.

Mr. C. Petersen, of Windhausen, Germany, gives the following as the rule for churning whole milk:

"The evening milk of one day and the morning milk of the next are churned together. The former is strained into a tub directly after milking, and the latter added to it next morning. In summer the milk is allowed to stand, at most, two feet high in the tub; in the winter about two and a half feet. In very hot weather the morning milk is cooled down to about 60° before it is added to the evening milk. Under these circumstances the milk is nearly always ripe for churning when the evening milk has stood thirty-six and the morning twenty-four hours. The temperature of the milk when being churned should be about 65°, or a few degrees warmer than when cream is churned. The churning itself should be as little hurried as possible, since, the butter globules being more widely separated in milk than in cream, rather more time is needed for them to collect."

WORKING THE BUTTER.

As soon as the butter has become hard draw off the buttermilk, and remove the butter with a wooden clapper or paddle into a wooden tray, which may be either oblong or round in shape; we prefer the latter, as it is more easily moved round with a weight of butter in it. For a large quantity of butter there is used in Chester county a butter-worker table, with a substantial framework supporting a circular inclined platform, over which the manipulator rolls a cone-shaped wooden cylinder, followed by a scraper, which constantly replaces the butter before the

cylinder, and as the buttermilk is pressed out it runs rapidly away to the centre, through a tube, down into a bucket below. Its merits are that it rapidly works the milk out, and uniformly, without the hand coming once in contact with the butter, and is cleanly, as the milk at once flows into the bucket.

Another butter-worker table is somewhat similar. It is a revolving table about three feet in diameter, with an iron cog-wheel in the centre. The table is sloping to the outer rim, down which the milk as worked out is carried to a pail below. Over the table revolves a fluted, cone-shaped wooden cylinder, which, as it presses the butter, indents a number of gutters in it, which hasten the escape of the milk. At each side are bevelled blocks, which force the butter back again into rolls, ready for a new pressure by the cylinder. As the roller does not quite touch the table, there is no actual crushing of the particles.

Another butter-worker is made of a slab four feet long, twenty-five inches wide at the broadest part, tapering down to five inches wide at lower end, where an opening allows the escape of the buttermilk to a pail below, and a slab into which a long wooden lever, either square or eight-sided or a corrugated cone, fits loosely and allows it free movement over the entire surface of the slab. It has beveled sides, and the butter is placed upon the slab and worked by pressing the lever down upon the successive portions of it until it is all worked.

Some use a large marble slab, set slightly inclined upon a table to allow the milk to run off as it is worked out, with a gutter at the lower side to carry the milk into a pail; upon this the butter is easily worked, and the slab can be kept very clean.

If butter is washed after the buttermilk is all, or nearly all, extracted, as many do, it should stand but a short time after salting before it is worked enough to remove nearly

all the water, when it may be resalted, if necessary. It may then stand in a cool place, in thoroughly pure air, in order to harden, until the next day, when it should be worked and made ready for market. Butter should not be allowed to stand long before working, as it is apt to become streaked and to require working over to restore a uniform color; it is also apt to become rancid if neglected.

WORKING THE BUTTER.

Working the butter is one of the most delicate operations, and therefore requiring care, particularly the second working. If not worked enough, it will spoil; if worked too much, it is spoiled already. We will give these three rules: 1st. The butter should not be too warm when worked, nor should it be so cold as to make working it difficult. Dipping the ladle into cold water, if the butter in the bowl is warm enough to admit of putting the ladle through the whole mass without difficulty and dividing it without crumbling, and still hard enough to cut clean and smooth, not adhering to the ladle at all, then it is in right condition to work. 2d. It should be worked with careful and gentle, yet telling, *pressure*, and not by mashings and grindings against the sides of the bowl. 3d. The butter should not be finally worked until it is dry.

The butter should never come in contact with the hand, or as little as possible, as the hand renders it oily or greasy, and takes away the firm beauty of well-made butter. The butter having been put into the tray, the buttermilk is pressed out in a careful and gentle manner with a hard-wood clapper or ladle, turned over and over in the process, deep gashes being cut with the sharp edge of the ladle all through it, until the milk is all out and the air-bubbles are broken; then it is spread out, and one or one and one-eighth of an ounce of finest and best quality of salt to the pound sprinkled over it and lightly

worked in. If for immediate use or marketing, a much less quantity of salt is better. The rules for salting vary with the taste of the maker or his customers. Some say one ounce to three pounds, others one dessertspoonful to the pound, others a teacupful to six pounds, others one pint to fifteen pounds; but practice and taste are the usual guides. It must be remembered, too much of it destroys or overpowers the fine flavor and delicate aroma of the best butter. About one pound of salt to twenty pounds of butter is a fair average amount. It is then again partly spread out in the tray, and the tray is stood up on its edge in a cool place over-night, to allow the salt to thoroughly combine with the butter and any milk that may remain to drain off. In the morning it is worked over thoroughly with the paddle in one hand and a clean cloth soaked in ice-water in the other; the butter is flattened out and "sopped" with the cloth until every particle of milk or water is gathered out. The cloth is constantly washed in ice-water and wrung out during the process. It ought not to be worked long enough to heat it or break down the grain of the butter or make it waxy, and two—some put four—ounces of ground white sugar to ten pounds of butter are worked in, though many think the sugar is unnecessary. But sugar is a good preservative, and it tends to remove any bitterness of taste in the butter.

We give another receipt, where it is to be kept for months; this composition will be found more valuable than salt alone: Take of saltpetre one part, of loaf-sugar one part, of fine rock-salt two parts; beat the mass to a fine powder, and use one ounce of the composition to a pound of butter. This will give it a peculiar rich flavor, but it should not be used before two weeks old. Butter is often injured by using too much salt in preserving it; but this composition renders it unnecessary to salt to excess. For immediate use, salt alone is preferable.

We have spoken of the importance of using only the best salt; the following is a good test before using it: Dissolve a little in a glass tumbler; if the brine formed is clear and free from bitter taste, the salt is good; if, on the contrary, it is of a milky appearance, leaves any sediment or throws scum to the surface, it should be rejected.

There are times when the butter comes it comes soft and warm, and is difficult to take out. Then the milk can be drawn off and the churn half filled with ice-cold milk or pure ice-water, and churned until the butter hardens. If the ice disappears before this takes place, then it must be renewed. If the butter comes rather warm, put in twice the salt you usually do, work your butter just enough to mix the salt well through it, and set it away in a cool place for twenty-four hours, then take it up and work it over; much of the salt will be dissolved and work out.

In a dairy the yield of milk from cows longer or shorter time in profit will yield cream of different qualities; also, in skimming the cream some of it will be the first or richest and some of it will be later skimmings. Now, it it is hardly probable this varied cream will all yield butter at the same moment, or yield all there is in it; therefore often when the butter has come and is taken out, a further churning will yield an amount sufficient to pay for the extra labor.

We have said the best quality of salt, as some salt will give an unpleasant flavor to the butter and will not keep the butter so well. Ashton's Liverpool Dairy and the Onondaga Salt Company's are the best.

WASHING BUTTER.

We have said nothing about washing the butter, as many do, because we never wash our own, believing that all the buttermilk that is necessary can be worked out

without destroying the grain of the butter; also that washing it takes out the sweetness and flavor from it, makes it insipid and turns it rancid as soon as would any of the milk that may remain in it. We believe also that any water, hot or cold, put into the cream to alter the temperature when about to churn is injurious. Watered or washed butter will not keep. We are aware this is contrary to the practice and opinions of many, who will assert that buttermilk cannot be got out except by washing, and their butter will not keep without. We can only say this is not our experience, nor of the best butter-makers of Chester county.

If your spring or well is hard water, save enough ice to melt as wanted from rivers or streams, though the water may be hard, as when melted it will be soft, as the lime of hard water never congeals with the ice. Save also rain-water, and then with ice you will have it sufficiently cool to wash your butter, if that is your practice. The best way to wash it is when the butter is gathered in the churn—that is, when it separates from the buttermilk and forms lumps—the buttermilk should all be drawn off and cold water added; then the whole must be agitated or churned, and this water then be drawn off, and so on until the water ceases to look white. This serves to harden the butter and to work out the milk. It is claimed by many that water and butter will not commingle; but if they will not unify, the butter will hold the water to a small amount; but this, when the salt is worked, will be brine, and should not taint the butter.

The utmost moisture that should be found in thoroughly worked butter is a very slight dew, and it should be of such a firm consistency as to slice down, hardly dimming the surface of a knife-blade.

MARKETING BUTTER.

Marketing butter by many is thought to be the easiest part of the whole process, or the least important, judging by the manner in which it is done. But marketing it in the proper manner, or to make it the quickest selling, is half the battle. It should be put into the most inviting form to gain the best price. If the maker is near a market, and is about to retail it or sell it to those who are to retail it, it should be put into half-pound or pound lumps, and printed or stamped with some emblematic device, such as a sheaf of wheat, a cow, a beehive, or the maker's initials. After the final working, the scales are placed handy, and with the clapper a lump is cut off, placed upon the scales, and either added to or taken from, always being sure to give rather over than under a pound. It is then taken from the scale by one clapper in the right hand, and with the other clapper in the left, it is worked over into a ball by a few expert touches; and while held on the left-hand clapper, the right-hand one having been exchanged for the stamp-mould, the mould is dipped in cold water to prevent its sticking to the lump, and then pressed firmly upon it, then withdrawn, leaving a beautiful raised impression of the stamp upon it, and adding to its attractions. The fashion is now becoming prevalent of making the lumps square, which is more convenient for use and for packing in the market tray. It is also more convenient for the butter-maker, as it is done by a machine which squares and prints it at one operation, and also marks it, so that the consumer cuts it in four parts of about the right size for table, each piece being nicely stamped.

When it is all stamped, it is set aside in a cold place to thoroughly harden; in a tray in the spring-house water is best. When about to market it, each pound or roll is wrapped in a linen cloth taken out of ice-water or cold

spring-water, and laid upon the shelf of the tray or tub. Some market men have a square box made with a sliding lid and several shelves. On these shelves the pounds of butter are placed, the lid is dropped down in its grooves, as the box stands upright on one end, with a handle to carry it by on the other. This is very nice for winter use, when the butter will keep hard until sold; but for summer use there is provided a large tub made of cedar, with an inner tin vessel, with a well in each end for broken ice, and shelves on each side of them, one above the other, on which the butter is placed, and is removed as it is sold. The shelves are made of thin wood, and rest upon tin projections on the sides about three inches apart. The wooden tub is cooled in ice- or spring-water while the tin vessel is being filled with the ice and butter. The tin is then set into the wooden vessel, the lid closed, and the whole enveloped in a padded carpet covering made to fit, and again enclosed in an oil-cloth covering. It is thus effectually shielded from hot air and dust, and is opened out to the customer firm, cool and golden, and brings readily its seventy-five cents to one dollar and twenty-five cents per pound, thus well paying for the extra care. Many put up their butter in rolls of five or ten or more pounds, and sell it so, sometimes wrapped in muslin, sometimes not; but either way it never looks so nice and attractive as the nicely-stamped pound lumps, and of course does not bring so good a price.

In general terms, it may safely be said that the less possibility there is of interfering with the condition of the butter from the time it leaves the dairy till it reaches the larder, the better for both producer and consumer. To alter the condition of butter by redressing or repacking is commercially culpable, whilst the introduction of any other substance, however innocuous, is fraudulent adulteration. To prevent both effectively is to pack the butter at the

dairy in the several quantities to suit the requirements of larger or smaller households or dealers. These packages ought only to be opened for examination as to quality; the butter would in such a way be fully protected from injury, and as it left the dairy so it reaches the larder.

PACKING AND SHIPPING.

Packing of the butter for shipping should be done not later than the third day. Be careful before packing there is no milky water runs from it, for as sure as it is packed with the least drop in the butter you will hear from it next March or April. Pack it down solid in stone jars if for your own winter use, or in firkins if for shipping. Sprinkle a little salt on the surface, and covering it with a thick, fine cloth, put on the lid and place the jar in a dry, cool place. It is better to fill the vessel with one churning; but if not able to do so, pack in each churning solid, and exclude the air until it is full by pouring over it a strong brine, to be poured off when ready to be filled. If it is to be kept a long while or sent to sea, pour a little melted butter over the top of the jar before you put on the cloth. Butter put down this way in September or October, when the weather is cool and the quality of food is best, will keep till next June as good as newly-churned butter.

When exposed for sale, it is often found that the lower portion of the contents of the tub is the poorest, and the discovery of this fact causes not only a diminution of price on the whole package, but also suspicion of intended deception. Yet no deception has been intended. The difference in quality has arisen from improper management of the lower layers, the upper layer having been kept in good condition by carefully covering it with salt when placed in the tub. When forwarded to market in warm weather, this imperfectly-packed butter is placed in the

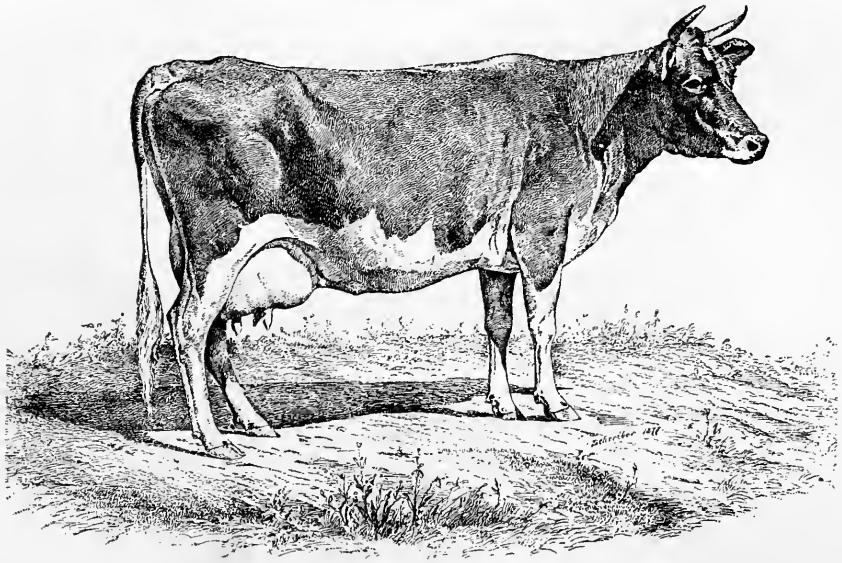
low temperature of an ice-car, and on its arrival at the city dépôt it is often unloaded and carted under a broiling sun.

It is very important that it should be kept from the air, as an exposure to the atmosphere will spoil the best butter that ever was made in a very short time. For this reason wooden tubs are not desirable to pack in, unless for a short time, as they are not sufficient protection against the action of the atmosphere, and often of themselves destroy the flavor of that portion of butter which comes in contact with them to the depth of an inch or more. When they are used, they should be of hemlock or of oak, filled with boiling water, to remain till cool, then soaked in brine for two or three days, and after the brine is poured out the sides and bottom must be rubbed with fine salt.

Makers of large quantities of butter, who store it and ship it when the market price is highest, after preparing the firkins as before described, pack the firkin full of butter, spread a cloth over the top, do not let the cloth expand over the sides, put in a layer of coarse Turk's Island salt, washed clean, upon the cloth, and put on temporary tops of round flat stones, as they keep the temperature cooler and more even than any other cover. The firkins are then stored in a cool place, better on open joists where the air can pass underneath them. When they are shipped for market, the cloth, with the salt, is lifted off, the firkin is turned down to let the brine drain off, the cloth, wrung out in brine, is replaced, and they are headed for market, where they arrive in sweet nice order.

Prof. Nyce's fruit-houses will keep butter any time pure and fresh, and large dealers will find it profitable to erect one for the purpose where all the requisites are cheap and plenty.

For domestic use it is a good plan to pack it in stone crocks holding two or three gallons, in layers of such thick-



MILKMAID.

One of the Centennial Premium Herd, owned by C. L. SHARPLESS.

ness as will be convenient for use, sprinkling a little salt between each layer, or laying a cloth between and covered with salt, to be lifted out for every new layer added; and when using it, take out a layer and cover up the rest from contact with the air. Never work it after it has been packed, for it is injured by so doing, but use it just as you take it out. Continue until the crock is nearly full; then cover closely with a fine muslin cloth, on which place a layer of salt half an inch thick; then fill with strong brine and cover with a stone cover. The secret is, Keep it cold and exclude the air.

If a family is small, and has bought say forty pounds, intending to make it last ten weeks, a profitable way, after a third or half is used, is to take all out, warm it a little, work over, but not overwork, adding two ounces of fine white sugar, a little salt and a little nitre to each five pounds; make into half-pound balls, stamp them, cover with linen cloths, and keep where no dust will fall on them, and in a cold place.

In families, or where the dairy is small, a good plan to have butter cool and firm without ice is by the process of evaporation, as practiced in India and other warm countries. A cheap plan is to get a very large sized porous earthen flower-pot with an extra large saucer. Half fill the saucer with water, set in it a trivet or light stand: such as is used for holding hot irons will do; upon this set your butter; over the whole invert the flower-pot, letting the top rim of it rest in and be covered by the water; then close the hole in the bottom of the flower-pot with a cork; then dash water over the flower-pot, and repeat the process several times a day, or whenever it looks dry. If set in a cool place, or where the wind can blow on it, it will rapidly evaporate the water from the pot, and the butter will be as firm and cool as if from an ice-house.

Another plan is recommended for preserving butter nearly fresh: After the butter is worked it is placed between linen cloths and heavily pressed to remove the water and buttermilk that may be left. It is then wrapped in clean white paper, which has been coated on both sides with a preparation of white of egg and fifteen grains of salt to each egg, the paper then dried, and heated before the fire, or with a hot iron just before it is applied to the rolls of butter. The paper excludes the air, so that the butter will keep fresh for a long time in a cool place and without any more salt than usual.

Butter-tubs may be used again and again, just as well as pork barrels, provided the butter they contained has kept sweet and the tub not saturated with its rancidity. Even then it may be cleaned by washing it with moderately strong hot lye, and afterward soaking with clean cold water thoroughly. This cleansing should be done immediately after the tub has been emptied, as indeed it should in the case of pork-barrels, cider-barrels, and all other vessels in domestic use.

BUTTER FROM WHEY.

Excellent butter, fit for the table, is said to have been made from whey, and sold in the New York market, bringing the best price. The following are two receipts for making it, but we doubt whether it will pay well, and if so only at the factories, if properly managed.

I. The Heating Process.—After separating the whey from the curd, place it in a tin vat and add a liquid acid, the vat with copper bottom and tin sides, about twelve feet long, three feet wide and twenty inches deep, or about these proportions; set over a brick arch; one gallon to the whey of fifty gallons of milk, if the whey is sweet, but less quantity if changed. Then bring it to a heat of 210°. When the cream rises and is skimmed off and placed in a

cool place, let it stand till next day. Then churn at a temperature of 56° to 68°, depending on the weather; work and salt it as usual. It will produce about one pound of butter from the whey of one hundred and fifty pounds of milk. The acid is made by taking any quantity of whey at boiling-heat after the cream is extracted, adding one gallon of strictly sour whey to ten gallons of this boiling whey, when all the caseine remaining in the whey is collected together in one mass, and is skimmed off. After the whey is allowed to stand from twenty-four to forty-eight hours, it is ready for use as acid. This process is repeated as often as necessity requires.

II. The Cooling Process.—Take a vessel made of zinc, or at least with a zinc bottom, about fifteen inches high, three feet wide and as long as desired; set the vessel in cold water and put in the whey, with a handful of salt to every ten gallons of whey. During the first two hours stir it up thoroughly from the bottom every fifteen minutes; afterward let it stand quiet for about twenty hours, and then skim it; then churn the cream, keeping it at about 58°. If above 60°, cool it; if below 56°, warm it. Churn it until the butter becomes granulated about the size of kernels of buckwheat. Let it stand about five minutes, then let the buttermilk run off; then throw on cold water. If not hard enough, let it stand until it becomes so before it is stirred much. Then rinse with cold water until it runs off clear; then churn together or "gather" it; press the water out, salt it, one pound to eighteen or twenty, and let it stand till next day; then work it until it becomes perfectly even in color. Get it ready for market.

COMPARATIVE PROFITS OF BUTTER-MAKING.

Of the four ways of realizing from milk—butter, cheese, condensed milk and milk for fami'y use—butter, *if properly made*, is the most profitable. In the form of con-

densed milk, at prices hitherto obtained, a quart of milk reduced by evaporation to one-fourth its bulk yields about half a pound in weight and realizes fifteen cents, at the rate of three dollars and fifty cents per dozen for pound cans; from which deduct one-third for cans and manufacturing, leaving ten cents per quart for the milk. At fifteen cents for cheese, requiring four and a half quarts for a pound, and forty-five cents for butter, requiring eleven quarts, the product would realize four cents per quart for cheese and four and a half cents for butter, less cost of making; and if butter and skim-cheese are made, it will show five cents per quart. Where the milk is sold and the butter is sold, both being near good markets and both of good quality, butter at fifty cents pays a better profit, equal to ten per cent. The superior manner in which cheese has been made of late years has more than trebled the foreign and home demand for it, and consequently, as the increase of the manufacture of butter has not increased with the population, there is a scarcity of butter, and the prices have risen proportionately.

BUTTER FACTORIES.

Creameries, or factories where butter or butter and cheese are made, are now rapidly increasing, and farmers and consumers are to be congratulated upon the fact; for where the creameries are properly managed—and they will not pay if they are not—the butter will be of superior character to the same quantity made by many hands.

The most profitable mode of conducting a creamery in a neighborhood where there are a number of dairy farms is for routes to be laid out and the wagons of the factory to call at morning and evening and collect all the milk on the route. The routes should not be longer than can be collected in one trip or the wagon can take. The milk is all put into vats and allowed to stand over-night, at a

temperature of 60°, and is then skimmed and made into butter, while the new milk of the morning is added to the skim-milk and the whole made into cheese. Skim-milk cheese has not heretofore ranked as very good, but greater care and knowledge in making it has elevated the market-price of it. The net returns to the farmers contributing milk to the creameries has thus far yielded them from three and a half to four and a half cents.

The details of butter-making in the creameries must be, and is, so nearly what we have already described in the previous pages that it is not worth while to devote more space to it, everything being conducted similarly, but only on a larger scale. The advantages to the farmer to have a creamery in his neighborhood are so great that we can only urge him to look into the matter. The creamery will save himself and family a large amount of labor, and bring him larger and more reliable returns, as the creameries that make good butter will soon make a name and price for their manufactures and always command a ready sale at the best market-prices. The merchants and dealers in large cities have avenues of sale which the small maker cannot reach, and would much prefer to have the highest price butter to deal in, and in the largest quantities.

Farmers can unite and establish a creamery in their vicinity on the joint-stock plan, with a superintendent to manage it, and dividing the profits and liabilities among themselves; or it can be established by an enterprising man among them who will either make the butter for so much per pound, or who will purchase the milk direct on his own account.

Before entering into it, it will be well to examine some that are already established and have a good reputation and ascertain particulars; such as, in the East, the Franklin Creamery, at Franklin, Delaware county, New York, four miles from the line of the Albany and Susquehanna

Railroad; and in the West, the Elgin Butter Factory, at Elgin, Illinois.

CONCLUSION.

We have shown in the preceding essay how to make a prime quality of butter; and we now state that while a fair article of tub-butter sells for from thirty to fifty cents, and a vast quantity is sold, perhaps, for not more than half of even these prices, there is at the same time an increasing, though yet small comparatively, quantity that is selling from seventy-five cents to one dollar per pound. The relative prices are so widely apart because there is too much of the one and too little of the other, and because there is too little care taken in making the one and great care taken in producing the other, the one yielding no profit in the production and the other affording a handsome one. It is practicable for producers of butter in the United States to increase its average price ten cents per pound, and this enhancement would put in their purses one hundred millions of dollars. This is too large a sum to pay for ignorance, carelessness and lack of cleanliness. Reader, will you resolve to do your share in gaining your part of this great sum?

We append some of the most recent statistics relating to butter:

MILCH-COWS AND BUTTER PRODUCTS IN THE UNITED STATES FOR THREE DECADES.

YEARS.	COWS.	BUTTER.
	Number.	Pounds.
1870	8,935,332	514,092,683
1860	8,585,735	459,681,372
1850	6,385,094	313,345,306

These figures are from the census reports, and are, of course, only approximately true, the fact being that they should be about twice as large in amount, from the diffi-

culty of collecting over so large a surface the exact figures. The increase of cows from 1850 to 1860 was thirty-four per cent., and from 1860 to 1870 only four per cent. The production of butter increased during the first decade nearly forty-six per cent., increase of population thirty-five and a half per cent.; and less than twelve per cent., during the second, increase of population twenty-two and a half per cent. For the twenty years from 1850 to 1870 the increase of the butter product was sixty-four per cent., increase of population sixty-six per cent. The exports of butter during four years were—

YEARS.	POUNDS.	VALUE.
1870	2,079,751	$570,432
1871	8,568,012	1,606,239
1872	5,044,227	1,041,032
1873	4,074,657	947,986

The census exhibits for 1850, 1860 and 1870, collated with statistics of exports and imports, show for each individual an average yearly consumption of butter ranging from thirteen and a half to fourteen and a half pounds, the latter figures being for the middle period, or that of 1860.

Prof. Willard estimates the average annual yield of milk per cow at eighteen hundred quarts, of an average value of two and a third cents per quart. At this rate our cows in 1873 produced 19,269,540,000 quarts, worth $449,622,600, which estimate is very nearly carried out by one of Mr. Willard's of the quantity and value of our dairy products for 1873. Thus—

Milk consumed as food, at 2⅓ cts. per quart	$213,000,000
Condensed milk	1,000,000
Butter, 700,000,000 lbs., at 25 cts. per lb	175,000,000
Cheese, 240,000,000 lbs., at 12 cts. per lb	28,800,000
Whey, sour milk, etc., converted into pork	10,000,000
Total	$427,800,000

The total amount approximated $430,000,000; in 1874 it will vastly exceed these figures. Nearly the whole bulk of this enormous production is consumed at home. Only low grades of butter are sent abroad. Our total export of butter, cheese and condensed milk in 1873 amounted to $12,939,320.

The following averages of milk required for one pound of butter are the results of careful tests made during one week in each month from March, 1871, to January, 1872, inclusive. Herd of high-grade short-horns:

March.....12.5 quarts.	July.....12.2 quarts.	November.11.5 quarts.
April.....12.4 "	August.....15. "	December. 9.8 "
May .....12. "	September 12. "	January ...10. "
June.....12.2 "	October....11.7 "	

PRICE, 25 CENTS.

BUTTER

AND

BUTTER MAKING,

WITH THE

BEST METHODS

FOR

PRODUCING AND MARKETING IT.

BY

WILLIS P. HAZARD,

PRESIDENT OF THE CHADD'S FORD FARMERS' CLUB, AUTHOR OF "THE JERSEY, ALDERNEY AND GUERNSEY COW," ETC.

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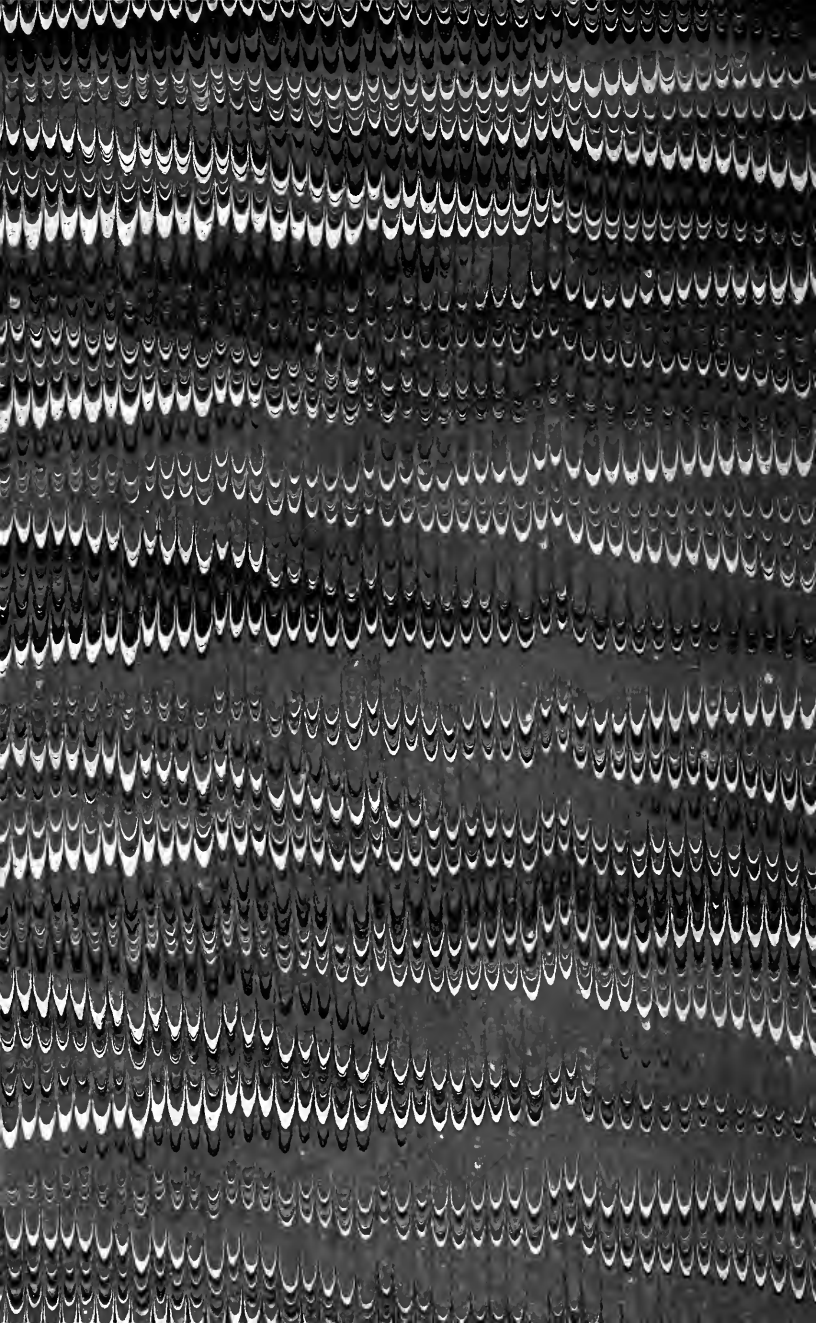

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